

WHAT IS CLAIMED IS:

1. A method for estimating a position of moving objects in a set of image data, comprising the steps of:
- 5 identifying a position of an object in a first frame of image data acquired at a first time;
- determining that the object is undetected in a second frame of image data acquired at a second time;
- 10 estimating movement of the object to determine its estimated position in the second frame of image data using at least one of velocity and acceleration of the object and time between frames of image data; and
- using the estimated position to determine a position of the object in a third frame of image data acquired at a third time.
2. The method of claim 1, wherein the step of identifying comprises
- 15 the step of:
- maintaining a database of positional values of the object.
3. The method of claim 1, wherein the step of identifying comprises
- the step of:
- 20 maintaining a database of stabilization values of the object.
4. The method of claim 1, wherein the step of determining comprises
- the step of:
- 25 retrieving positional values of the object from a database of positional values.

5. The method of claim 1, wherein the step of determining comprises the step of:

retrieving stabilization values of the object from a database of stabilization values.

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6. The method of claim 1, wherein the step of estimating comprises the step of:

calculating difference values between the first frame of image data and the second frame of image data for positional values of the object.

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7. The method of claim 1, wherein the step of estimating comprises the step of:

calculating difference values between the first frame of image data and the second frame of image data for stabilization values of the object.

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8. The method of claim 1, wherein the step of estimating comprises the step of:

subtracting stabilization difference values from positional difference values for each frame of image data to generate stabilized positional difference values.

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9. The method of claim 8, wherein the step of estimating comprises the step of:

determining a data time interval using a time between frames of image data.

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10. The method of claim 9, wherein the step of estimating comprises the step of:

determining an absolute displacement of the object by summing the stabilized positional difference values over the data time interval.

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11. The method of claim 10, wherein the step of estimating comprises the step of:

calculating a constant acceleration of the object during the data time interval using a predetermined acceleration function.

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12. The method of claim 11, wherein the step of estimating comprises the step of:

calculating a current velocity of the object during the data time interval using a predetermined velocity function.

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13. The method of claim 12, wherein the step of estimating comprises the step of:

calculating an estimated movement of the object from the constant acceleration and current velocity using a predetermined position function.

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14. The method of claim 13, wherein the step of estimating comprises the step of:

calculating an actual movement of the object by adding stabilization difference values to the estimated movement of the object.

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15. The method of claim 14, wherein the step of estimating comprises the step of:

calculating an estimated position of the object in the second frame of image data by adding the actual movement of the object to the position of the object in the first frame of image data.

16. A system for estimating a position of moving objects in a set of image data, comprising:

a memory that stores steps of a computer program to:

identify a position of an object in a first frame of image data acquired at a first time,

determine that the object is undetected in a second frame of image data acquired at a second time,

estimate movement of the object to determine its estimated position in the second frame of image data using at least one of velocity and acceleration of the object and time between frames of image data, and

use the estimated position to determine a position of the object in a third frame of image data acquired at a third time; and

a processor for accessing the memory to execute the steps.

17. The system of claim 16, wherein the memory stores steps of a computer program to:

maintain a database of positional values of the object.

18. The system of claim 16, wherein the memory stores steps of a computer program to:

maintain a database of stabilization values of the object.

5 19. The system of claim 16, wherein the memory stores steps of a computer program to:

retrieve positional values of the object from a database of positional values.

10 20. The system of claim 16, wherein the memory stores steps of a computer program to:

retrieve stabilization values of the object from a database of stabilization values.

15 21. The system of claim 16, wherein the memory stores steps of a computer program to:

calculate difference values between the first frame of image data and the second frame of image data for positional values of the object.

20 22. The system of claim 16, wherein the memory stores steps of a computer program to:

calculate difference values between the first frame of image data and the second frame of image data for stabilization values of the object.

25 23. The system of claim 16, wherein the memory stores steps of a computer program to:

subtract stabilization difference values from positional difference values for each frame of image data to generate stabilized positional difference values.

5 24. The system of claim 23, wherein the memory stores steps of a computer program to:
 determine a data time interval using a time between frames of image data.

10 25. The system of claim 24, wherein the memory stores steps of a computer program to:
 determine an absolute displacement of the object by summing the stabilized positional difference values over the data time interval.

15 26. The system of claim 25, wherein the memory stores steps of a computer program to:
 calculate a constant acceleration of the object during the data time interval using a predetermined acceleration function.

20 27. The system of claim 26, wherein the memory stores steps of a computer program to:
 calculate a current velocity of the object during the data time interval using a predetermined velocity function.

25 28. The system of claim 27, wherein the memory stores steps of a computer program to:
 calculate an estimated movement of the object from the constant acceleration and current velocity using a predetermined position function.

29. The method of claim 28, wherein the memory stores steps of a computer program to:

calculate an actual movement of the object by adding stabilization difference values to the estimated movement of the object.

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30. The system of claim 29, wherein the memory stores steps of a computer program to:

calculate an estimated position of the object in the second frame of image data by adding the actual movement of the object to the position of the object in the first frame of image data.

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31. A computer-readable medium containing a computer program that performs the steps of:

identifying a position of an object in a first frame of image data acquired at a first time;

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determining that the object is undetected in a second frame of image data acquired at a second time;

estimating movement of the object to determine its estimated position in the second frame of image data using at least one of velocity and acceleration of the object and time between frames of image data; and

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using the estimated position to determine a position of the object in a third frame of image data acquired at a third time.

32. The computer-readable medium of claim 31, wherein the computer program performs the step of:

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maintaining a database of positional values of the object.

33. The computer-readable medium of claim 31, wherein the computer program performs the step of:
maintaining a database of stabilization values of the object.

5 34. The computer-readable medium of claim 31, wherein the computer program performs the step of:
retrieving positional values of the object from a database of positional values.

10 35. The computer-readable medium of claim 31, wherein the computer program performs the step of:
retrieving stabilization values of the object from a database of stabilization values.

15 36. The computer-readable medium of claim 31, wherein the computer program performs the step of:
calculating difference values between the first frame of image data and the second frame of image data for positional values of the object.

20 37. The computer-readable medium of claim 31, wherein the computer program performs the step of:
calculating difference values between the first frame of image data and the second frame of image data for stabilization values of the object.

25 38. The computer-readable medium of claim 31, wherein the computer program performs the step of:

subtracting stabilization difference values from positional difference values for each frame of image data to generate stabilized positional difference values.

5 39. The computer-readable medium of claim 38, wherein the computer program performs the step of:

 determining a data time interval using a time between frames of image data.

10 40. The computer-readable medium of claim 39, wherein the computer program performs the step of:

 determining an absolute displacement of the object by summing the stabilized positional difference values over the data time interval.

15 41. The computer-readable medium of claim 40, wherein the computer program performs the step of:

 calculating a constant acceleration of the object during the data time interval using a predetermined acceleration function.

20 42. The computer-readable medium of claim 41, wherein the computer program performs the step of:

 calculating a current velocity of the object during the data time interval using a predetermined velocity function.

25 43. The computer-readable medium of claim 42, wherein the computer program performs the step of:

calculating an estimated movement of the object from the constant acceleration and current velocity using a predetermined position function.

5 44. The computer-readable medium of claim 43, wherein the computer program performs the step of:

 calculating an actual movement of the object by adding stabilization difference values to the estimated movement of the object.

10 45. The computer-readable medium of claim 44, wherein the computer program performs the step of:

 calculating an estimated position of the object in the second frame of image data by adding the actual movement of the object to the position of the object in the first frame of image data.